Agricultural Research Department

The Winand Staring Centre for Integrated Land, Soil and Water Research

Report on a cooperation mission to the Kenya Soil Survey

April 1993

E.M.A. Smaling

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International Activities Report 27

DLO Winand Staring Centre, Wageningen (The Netherlands), 1993

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The DLO Winand Staring Centre is continuing the research of: Institute for Land and Water Management Research (ICW), Institute for Pesticide Research, Environment Division (IOB), Dorschkamp Research Institute for Forestry and Landscape Planning, Division of Landscape Planning (LB), and Soil Survey Institute (STIBOKA).

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SUMMARY

1. As the National Agricultural Research Project, Phase I (NARP-I) of the Kenya Agricultural Research Institute (KARI) comes to an end in October 1993, the attention during this mission was focused on:
- comparing expected and realized output of the Kenya Soil Survey (KSS) at the end of NARP-I;
- the improvement of the NARP-II document as far as KSS is concerned.

2. A rough estimate is that approximately 75% of the expected output, as laid down in the 1990 Inception Report for KSS/NARP-I, will be realized by October 1993.

3. Crucial activities to be finalized before the project ends, are:
- printing of 13 pending reports, including the Transmara site evaluation, and the Busia and Makueni reconnaissance surveys;
- printing of the Bondo and Chuka soil maps;
- preparation of a draft map and legend of the Malindi natural resource survey;
- printing of a KSS brochure;
- printing of proceedings of the GIS national workshop (March 1992) and the Kwale (September 1992) and Kisii/Nyamira (March 1993) District workshops.

4. Workshops were held on:
- a Kenyan Soils and Terrain Digital Database (KENSOTER), a collaborative project between KARI/KSS and ISRIC, funded by UNEP;
- a Kenyan National Soil Reference Collection and Database, possibly to be incorporated in the NARP-II programme;
- increased collaboration between KSS, the KARI Regional Research Centre in Kisii and provincial, district and divisional staff of Nyanza Province and Kisii/Nyamira Districts.

5. In order to assist the April 1993 Netherlands/KARI reformulation mission, the general workplan for KSS as laid down in the NARP-II document has been revisited. This resulted in the formulation of eight research and development subprogrammes. The recommendations by the 1992 Evaluation Mission and the Project Liaison Unit have been taken into account.

1 INTRODUCTION

Between March 4 and 27, 1993, Dr Ir E.M.A. Smaling of the Winand Staring Centre for Integrated Land, Soil and Water Research (SC-DLO), Wageningen, The Netherlands, paid a working visit to the Kenya Soil Survey (KSS), Nairobi, Kenya. KSS is a section of the National Agricultural Research Laboratories (NARL), which belongs to the group of 15 national research centres in the Kenya Agricultural Research Institute (KARI), in the Ministry of Research, Science and Technology.

Since 1972, KSS is supported through a bilateral agreement between the Government of Kenya (GoK) and the Netherlands Directorate General for International Cooperation in the Netherlands Ministry of Foreign Affairs (DGIS). The cooperation between KSS and SC-DLO is laid down in a Twinning Agreement and an Inception Report, and is supported in The Netherlands by a Project Liaison Unit (PLU). The present phase of support coincides with the first phase of the KARI National Agricultural Research Programme (NARP-I). Reports of previous missions (March and October 1992) are available at KSS and at SC-DLO, Department of International Cooperation.

By the end of October 1993, NARP-I will come to an end. During the mission, the attention was largely focused on:

- the work KSS has to finish prior to the end of NARP-I, in order to live up to the expected output as laid down in the Inception Report of 1990;
- improve the NARP-II document as far as the KSS mandate is concerned; this should assist the mission that is to reformulate the Netherlands assistance to KARI (April 5-30, 1993).

2 EXPECTED OUTPUT KSS BY THE END OF NARP-I

Main achievements planned for completion during NARP-I have been formulated as follows (Source: Inception Report 1990).

1. KSS will become self-supporting with respect to operational costs, through the establishment and implementation of a revolving fund; further independence from donor support at the end of NARP-I is appreciated.

A major effort has been made to accomplish this objective; KSS is now allowed to reinvest 70% of its revenues into the centre. The revenues are, however, not yet such that the 'Operational Costs' could be covered in full.

2. Chargeable jobs are done according to proforma contracts with fixed terms, officially gazetted by KARI.

This objective has been realized. For clients from within KARI and from other ministries, however, no overhead is charged; hence, no revenues are accrued from here.

3. The geographical information system Arc/DBase will be installed and operationalized.

This objective has been realized, and is in the process of becoming a cornerstone of KSS's future role in natural resource management and land use planning.

4. Soil and land evaluation maps and reports of the Narok, Kilifi, Embu, Meru, Busia and Siaya Districts will be completed and published.

This objective has not been fully realized. The Narok survey will be completed before the end of NARP-I, and maps and reports will be printed for Busia, Transmara and Makueni mapsheets.

5. Map polygons and associated data sets of the above-named district surveys are stored in the GIS, and thematic maps of interest to land use planning are retrieved and presented to the relevant authorities.

This objective has been realized in the sense that the priority listing was changed to include the Kwale, Kisii and Nyamira Districts; through workshops in these districts, KSS information was passed on to the relevant provincial, district and divisional authorities, and to the multidisciplinary staff of the KARI regional research centres. In return, KSS staff received feedback from these authorities as to better ways to serve their needs in squaring issues related to natural resource management, agriculture and land use planning.

6. An updated version of the 1 : 1 000 000 soil map of Kenya will be published; map polygons and associated data sets are stored in the GIS.

This objective was shelved, since FAO and UNEP already did some work on digitizing of KSS's 1 : 1 000 000 soil and agro-climatic zones map; next, the KENSOTER project, which is about to take off (May 1993) is supposed to largely cover this objective.

7. A full-colour brochure on KSS will be published and is meant to attract a broader group of clients.

This objective has been pending for some time, as rapid developments at KSS (in particular on the GIS) left the draft brochure somewhat obsolete after 1-2 years; it will now be out by late April 1993 in order to coincide with the presence of the reformulation mission.

8. Through annual workshops, on-the-job training will take place in GIS (1990), land evaluation for different users (1991), soil management and conservation techniques (1992), and the role of soil science in land use planning (1993).

All these workshops took place, except for the 1993 workshop, which will be held in August or September.

9. The staff situation should improve so as to reach a total of 2 PhD., 10 MSc. and 10 BSc., 15 technical officers and 15 technical assistants.

This objective was hard to meet, as supra-nationally imposed structural adjustment programmes made it impossible for KARI to recruit from outside; three officers from within KARI were redeployed to KSS, but this was well below the number of officers that resigned or retired during the same period. Present staff situation is 1 PhD., 11 MSc. and 4 BSc., 9 technical officers and 9 technical assistants.

10. Equipment will be supplied annually according to specifications by the field survey, soil and water management, cartography and laboratory sections; this should enable staff to work without delays.

This objective was not difficult to meet as it was rather vaguely postulated; major procurements included GIS hardware and software (partly financed out of KARI core funding), a modern printing press, a spectrophotometer, a high-powered voltage stabilizer, four Landrovers and one Peugeot station wagon.

3 MAJOR FINDINGS DURING THE PRESENT MISSION

3.1 Natural resources surveys

Thirteen survey reports are ready for printing, including the Makueni and Busia reconnaissance reports. The new printing press has, however, been exploited to the full extent by KARI Headquarters for printing of the report of the National Agricultural Research Project, Phase II. All these pending reports must be printed **before June 30** in order to be quoted as project output in the final report on NARP-I.

Also to be finished prior to termination of this NARP-I project phase are: the printing of the Bondo and Chuka soil maps, and the preparation of a draft map and legend of the Malindi natural resources survey.

3.2 Database management and geographic information system

The installation of the GIS has been a major event at KSS during NARP-I. A good amount of output has been realized, as shown Annex 1.

Some organizational improvements concerning the GIS section are still needed. Due to the high demand from within KARI, the workload in the section is very high, particularly for the cartographer. Still, the officers need to become more skillful in MS-Dos, DBase and in proper storage and management of the GIS products. Too few real and problem-oriented applications have been realized so far. The GIS unit should be more than just an automated cartography department.

The manager of the group should be more out-going, obtaining information from other GIS-users in the country and abroad. He should also be more innovative in the sense of coupling land evaluation (ALES) with GIS manipulation opportunities; there is too little initiative whereas he is supposed to be managing the entire section and stimulate the other officers.

The cartographer is the only person in KSS who digitizes; two more cartographers should be trained as such.

Database development and management still need extra backing, as the impact has been below expectations. Most of the unit and profile description of the reconnaissance maps could have been entered by now. The database manager is not capable of running the database management section all by himself; the newly deployed Technical Officer (Owenga) will be trained in Wordperfect, DBase and MS-Dos, upon which he will be attached to the section for database management duties. As a result of the start of the KENSOTER project, staff members Gicheru and Njoroge will also become conversant with database development.

A databank is to be bought for the safe, fire-proof storage of GIS output.

Reports on the GIS National Workshop (Okoth, March 1992) and the Kwale (Aore and Kilambya, September 1992) and Kisii/Nyamira (Aore, March 1993) District Workshops must be ready and printed by **May 31, 1993**. Printing of the proceedings of the National Workshop is sponsored by the Rockefeller Foundation.

3.3 Land evaluation

In an internal staff meeting, the officers in charge of land evaluation reported on the progress as to the acquisition of research data on crop production under different environmental conditions, and at different input levels. The output on land evaluation during NARP-I has in general been disappointing. In spite of the 1991 workshop on land evaluation, including building of ALES decision trees, hardly any effort was undertaken to convert the KSS system into ALES, whereas the validation of the system in the field has not yielded any interesting report or paper. This should therefore become a key issue in NARP-II. Making decision-trees for the different areas that were surveyed is not a very demanding job, and could be completed within a week.

3.4 Laboratories

As space and staff problems have been persistent throughout NARP-I, a support mission by the KSS Project Liaison Unit on improved laboratory management was envisaged. In the near future, however, staff from KARI Headquarters will move to the new premises in Loresho, and a new NARL administration block is nearing completion. As it is (i) not yet clear how the extra space will be divided among NARL sections, and (ii) funds for the remaining period of NARP-I are limited, it was decided to shelve this mission until 1994.

3.5 Cartography and library

The staff from the cartography and library sections have to be commended for their outstanding work and their consistent output. In this respect it is disappointing to note that staff that underwent training abroad during NARP-I has not yet been promoted, as has been the case at other NARL sections and KARI centres. The output and moral well-being of an institute does not only depend on the remuneration for those who hold academic degrees. The KARI Chief Personnel is urged to rectify this unbalanced situation.

3.6 Research projects

Dr. Kiome obtained his PhD. degree from East Anglia University by early 1993. He is now back in the UK to turn his thesis into some journal articles, and to establish research linkages, useful for KSS during NARP-II. He also drafted a programme on land evaluation and soil and water management, which is proposed to be incorporated in NARP-II as Programme 3 (See Section 5).

Mr. Wokabi went through a period of intensive fieldwork in support of his PhD. research. Short-rains experiments will be harvested soon. Data analysis has started,

and will continue in The Netherlands, where he will return from June 1993 up to the completion of his work.

Mr. Okoth stayed in Wageningen between January 24 and March 6 to work on a PhD. proposal in the context of a larger project: 'Environmental degradation of the Athi-Galana-Sabaki river basin', a project proposal still to be submitted to EC's Life Sciences and Technology Development programme (STD-3). Okoth, who will most likely be supervised by professors in Agronomy and in Remote Sensing from Wageningen Agricultural University, will focus his research on land use and management patterns in subcatchments in Kiambu District. Remote sensing techniques will be used to classify land use and management types, and a time series will provide clues on the rate of intensification of land use and land degradation. A Wageningen student will assist Okoth between May and July to make a start on site characterization and aerial photo interpretation.

3.7 Other matters

The long-awaited KSS brochure will be out by **April 20, 1993**, but since developments at KSS have taken place so rapidly, the original text has become slightly obsolete already. A revised text was taken to Colourprint Ltd. for printing.

At the request of RNE, stock-taking will be concluded before **April 30, 1993**, so as to incorporate a list of assets in the final report on NARP-I.

On vehicles, RNE wrote to KARI to clarify the status of the elder (grounded) vehicles which are still within NARL but not used by KSS anymore. KARI should either buy them or they should be publicly auctioned, upon which 70% of the revenues could be used for reinvestments in KSS. A problem is that when selling the vehicles, tax should be paid as they were imported duty-free.

On equipment, the sections Database/GIS, computer room, cartography and the laboratories were advised to judge whether major procurements will be needed during the next five years, and present their requests to the reformulation mission accordingly.

Airfreight for KSS (computers, printing press spares, chemicals) was cleared by March 20, after having been at the airport for 3 months. Sending the consignment by boat might have been faster. In future, original bills of lading will be submitted to RNE, with copies to KARI rather than the other way around.

A new Technical Officer was recently transferred from KARI's Kibos Research Centre to KSS. He will be involved in survey work, and also in the Database/GIS section. The attempts by KARI Headquarters to assist KSS in solving its understaffing problem are appreciated, but have not yet solved the problem. The reformulation mission should pay due attention to this serious constraint. In the weekends, one can normally find a considerable number of staff members (mostly the same people) on the job, without claiming any overtime payments.

3.8 Winding up NARP-I

In line with the contract between DGIS and SC-DLO, a Final Report will be written, in which a summary of activities will be given and an overview of the output of KSS during this phase.

It is foreseen that NARP-I may financially extend into 1994, as some funds still remain after October 1993. RNE confirmed that unspent contingency allocations can be used to overcome a possible intermediate phase without funding.

4 WORKSHOPS (MARCH 1993)

4.1 KENSOTER and KENASREC projects

Between March 8 and 12, the KENSOTER project got off the ground at the KSS premises. Introductions were held by KARI, ISRIC and UNEP staff.

PLU-member Van Engelen (ISRIC) spent a full week training Messrs. Gicheru and Njoroge (KSS) and a number of other interested staff. From outside, interest was shown by the DRSRS and ICRAF. A Memorandum of Understanding was signed between KARI and ISRIC on the execution of the project. It will officially start on May 1, 1993 and will last for approximately 2 years.

As the budget provides for subcontracting data-entry jobs to third parties, an ex-FURP computer operator, who already did some good jobs for KSS in the recent past (Owiti) has been found willing to contribute to the project for its entire duration.

Kauffman (ISRIC) held a presentation on March 11 on the development of the National Soil Reference Collections programme, and the anticipated establishment of a NASREC in Kenya. KSS has a reasonably large set of soil monoliths, but their state of display is below par at the moment. Waruru and Onyono (KSS) will be in charge of this project, which may start by early 1994 pending approval by KARI/NARL. Messrs. Waruru followed a NASREC course at ISRIC in 1989, but then left for MSc. studies in 1990. A detailed workplan was drafted by Kauffman and Waruru and will be considered for incorporation in the NARP-II proposal.

4.2 Kisii/Nyamira district workshop

Between March 17 and 20, a workshop was held in Kisii. The aim of the workshop was similar to the one held in Mombasa in September 1992, i.e. to disseminate KSS information to the provincial, district and divisional levels and to receive feedback from the staff at those levels. A detailed programme of the workshop and a list of participants is given in Annex 2.

After two days of presentations, a third day was spent on discussing how to better integrate survey and research results as obtained by an institute as KSS with its national mandate with land use planning activities in the district. A linking role should be played by the KARI Regional Research Centres. The topics for discussion and the final recommendations are given below.

The workshop was very lively and many participants contributed significantly. The divisional officers provided important feedback from the farmers' levels. Such workshops provide ideal cross-pollination between individuals involved in natural resource management, agriculture, animal production, and land use planning issues at large.

- Topics for discussion (19/3)

1a. Who are the users of natural resource information and what are their specific needs, taking into account that there are different scales of operation (province-district-division-location-sublocation-farm)?

1b. How should the information be communicated to the different clients? Is GIS regarded as a useful tool in this respect?

2a. What are the major constraints concerning land use systems as they presently occur in Kisii and Nyamira Districts?

2b. Kenya Soil Survey is able to combine baseline information on land and land use requirements into a land suitability assessment. This should preferably be presented in a quantitative way (yield ranges, input requirements), and should be followed by a socio-economic evaluation from district planners. How can this be achieved?

2c. If a need for change in land use and management has been recognized, who should implement these changes?

2d. How is the issue of 'sustainable land use' regarded at the provincial, district and divisional level? How useful is, in this respect, research and extension on soil fertility maintenance through agro-forestry, green manuring, soil conservation, etc.?

3. What information is needed by farmers on the use of fertilizers and other inputs? What follow-up should be given to an activity such as the Fertilizer Use Recommendation Project? How can trial site data be extrapolated to farmers in areas of similar soils and climate?

4. How can research-planning-extension-farmer linkages be strengthened? As it should be an iterative process, how should 'trickling down' information and 'bottom up' feedback be put together and monitored? Farming systems analysis ?!

- Recommendations (19/3)

1. It is realized that there are different soil information requirements by different users. It is therefore recommended that KSS carries out soil investigations according to the requirements of specific users. These include soil conservationists, crop agronomists, livestock officers, irrigation engineers, planners, foresters and environmentalists. Such information include: soil type, agro-ecological zones, site suitability, soil fertility, soil depth, soil drainage, etc.

2. Having realised the need for tailor-made soil information, it is recommended that KSS simplifies its information to answer farmer and extension worker requirements such as how much fertilizer should be applied per unit area or even per plant. GIS information should answer site-specific questions. Such information should be made available to the subject matter specialists in pamphlet forms which can be used by the extension worker and the farmer. The extension worker should be able to recognize his area easily from GIS maps.

3. Having recognized the need for quantitative land suitability classification, it is recommended that Kenya Soil Survey continues to carry out physical land evaluation, and in addition the extension worker should investigate the farmer field conditions to assist in realistic quantitative classification of the land unit. Such classification should specify the management inputs and socio-economic conditions associated with specific yields obtained by the farmer and by research. In order to come up with accurate data, the methodologies for data collection should be harmonized and standardized.
4. Having recognized that the major constraints of optimum land use systems in Kisii and Nyamira districts are: high population growth rate, pests and diseases, soil structure, deteriorating soil fertility, high prices on farming inputs, use of wrong fertilizers and other farm packages, low technical know-how on the side of the farmers, poor infrastructure, lack of labour, lack of credit facilities, abrupt weather changes, slow dissemination of technical messages, blanket recommendations, etc., it is recommended that information, especially that on fertilizer(s) use, should be soil and site specific. On low fertility soils, the regional research centres should regularly carry out soil fertility tests.
5. In the event that a need for a change in land use and management has been recognized, change should be implemented by the policy makers. Where it is felt that the change is rather drastic and may be received with some misgivings, a need for a land use policy is essential. The need to educate the local people was stressed while at the same time the more innovative farmers can be used to bring about changes in the rest of the community.
6. Having recognized the need for sustainable agricultural production, it is recommended that research should be carried out by KARI to address specific subjects such as agroforestry, fertilizer use, green manure, soil and environmental conservation, cropping patterns, moisture conservation and fodder quality improvement. Such research should as much as possible answer farmers' problems and should be able to be replicated to similar conditions elsewhere.
7. Having recognised the need for research-planner-extension-farmer linkages, it was felt that barriers exist between the researchers, extension workers and the farmers. A communication barrier is the one which came out clearly in the workshop. It was felt that technical packages from the reseachers should be in a simple language acceptable to the extension worker. Another issue which came up clearly is that such workshops should be held regularly so that all the key players can exchange views and also interact. The other issue was the Farming System Approach (FSA). It was felt that District FSA teams should be formed comprising the researchers and extension workers who should write up research proposals together and then solicit funds collectively. A bottom-up approach should be adopted. To avoid duplication of efforts, KARI should liaise with the other organisations such as Kenya Wildlife Services, UNEP, DRSRS etc.
8. Having recognized the need for expedite information exchange between KARI/KSS and the extension workers, it is recommended that soil test results should be made available to the extension workers in the shortest time possible.

5 RESEARCH PRIORITIES AND GOALS DURING NARP-II

5.1 Recommendations by the PLU

The Project Liaison Unit (PLU), supporting KSS from The Netherlands, convenes meetings when one or more KSS staff members are visiting The Netherlands. In the presence of the Director NARL (Dr. Muchena) and a senior research officer KSS (Mr. Okoth), the following priorities for KSS during NARP-II were formulated during the meeting of February 11, 1993:

a. District focus should be further worked out. Research executed by KSS staff should, as much as possible, be problem-oriented and executed together with KARI's Regional Research Centres.
b. The present organizational structure of KSS should be revisited. The suggested alternative organogram is given in Annex 3.
c. Land evaluation needs major attention, with emphasis on a level that is somewhere between the previous qualitative approach (S1-S2-S3 indications without reference to yields and input levels), and a fully quantitative approach (including simulation modelling); the latter can be developed and applied in research activities. Similarly, the Farming Systems Research component needs to be strengthened (Section 5.2; Programme 3).
d. Further strengthening of the GIS in terms of manpower, training, methodology development and equipment (Section 5.2; Programme 4).
e. Senior staff need management and didactic training to translate KSS knowledge into understandable terminology at district levels and below, and to foster public relations, amongst others through the annual agricultural shows, and the distribution of pamphlets, newsletter and technical briefs.

5.2 Major goals for KSS during NARP-II

The major goals of the programme in NARP-II are laid down in eight programmes, as listed below.

1. To carry out reconnaissance soil surveys and other land resources surveys in the country to produce information required for multipurpose land use planning at the National, Provincial, District and Divisional level. This component is strongly development-geared.

	1994	1995	1996	1997	1998
Murang'a District	12				
Kajiado District	1234	12			
Kirinyaga District		234			
Nandi District			1234		
Lamu District				123	
Meru District				4	1234

2. To carry out (i) semi-detailed soil surveys for project feasibility studies e.g. irrigation development, (ii) detailed soil surveys for farm planning or project design and implementation. (iii) site evaluations for project identification. This component is demand-driven.

3. To develop and improve land suitability evaluation criteria for various land uses, through:
   i) identification of the main land qualities/characteristics which affect crop and animal production in different benchmark soils and agro-climatic zones;
   ii) determination of the nature and magnitude of the production constraints as a result of unfavourable land quality values, i.e. establishment of quantitative relationships between crop/pasture yields and the land quality values that determine them, and including this in the KSS Automated Land Evaluation System;
   iii) development and testing of yield prediction models, soil and water management models and erosion-productivity models (in collaboration with the Winand Staring Centre, the Fertilizer Use Recommendation Project and the National Soil and Water Management Research Project).

4. To further develop a system for storage and management of land resources data (DBase, FAO Soils Database), and interface this with land evaluation software (ALES) and the geographic information system (Arc/DBase); to present this information in six-monthly district workshops (in collaboration with the KARI Regional Research Centres).
   1994: Laikipia and Trans Nzoia
   1995: Siaya and Makueni
   1996: Embu and Kilifi
   1997: Narok and Murang'a
   1998: Busia and Kirinyaga

5. To carry out studies on the relation between land use and management and land degradation in the upper Athi-Galana river basin, as a function of population development; airphotos and remote sensing materials will be used to study processes from the 1950s to present (in collaboration with the Winand Staring Centre, University of Amsterdam and Wageningen Agricultural University).

6. To study, on the basis of the recently completed 1:100,000 soil map, the different use potentials of the Narok District in relation to the conflicting land uses and their environmental implications: small-scale as well as large-scale agriculture; pastoralism; wildlife and tourism; in collaboration with the Winand Staring Centre and the University of Utrecht).

7. To compile a soil and terrain digital database for national and local agricultural planning purposes (KENSOTER; in collaboration with ISRIC and UNEP).

8. To build a National Soil Reference Collection and Database (KENASREC; in collaboration with ISRIC).

Detailed accounts of these intended programmes were prepared during the mission, but will not be published here. They were left at RNE for judgment and further discussions by the reformulation mission.

ACRONYMS

ALES	Automated Land Evaluation System
DGIS	Directorate General for International Cooperation, The Hague
DRSRS	Department of Resource Surveys and Remote Sensing (Ministry of Planning and National Development)
EEC	Delegation of the European Communities
FAO	United Nations Food and Agriculture Organization
FURP	Fertilizer Use Recommendation Project (section in NARL)
GIS	Geographical Information System
ICRAF	International Centre for Research in Agro-Forestry
ISRIC	International Soil Reference and Information Centre
KARI	Kenya Agricultural Research Institute
KSS	Kenya Soil Survey (section of NARL)
NARL	National Agricultural Research Laboratories
NARP	National Agricultural Research Programme
NASREC	National Soil Reference Collection and Database
PLU	Project Liaison Unit
RNE	Royal Netherlands Embassy
SC-DLO	DLO Winand Staring Centre for Integrated Land, Soil and Water Research
SOTER	Soils and Terrain Digital Database
TSBF	Tropical Soil Biology and Fertility Programme
UNEP	United Nations Environmental Programme

ITINERARY

4-3	mor	Arrival from Abidjan (ET 930)
	aft	Meeting P. Gicheru (KSS, Ag. Ag. Head) Meeting Dr. F. Muchena (NARL, Director) Meeting S. Wokabi (Head KSS)
5-3	mor	Attending Seminar at ICRAF by Dr. K. Shepherd
	aft	Meeting S. Nandwa, Dr. F. Schnir (FURP) Meeting KSS staff
7-3		Meeting W. Aore (Ag. Head, KSS)
8-3	mor	Meeting J. Rutto (Deputy Director Crops, Soils and Water KARI) and Dr. B. Ngundo (Ass. Director Soils, Water and Other Resources KARI)
	aft	Opening of the KENSOTER introductory workshop
9-3	mor	Discussions with KSS Database/GIS group and other KSS staff
	aft	Meeting S. Wokabi (Head KSS), P. Okoth (KSS)
10-3	mor	Meeting Dr. P. Sanchez (Director-General ICRAF) Meeting Dr. J. Lynam (Rockefeller Foundation)
	aft	Meeting Dr. C. Ndiritu (Director KARI), and KSS staff
11-3	mor	Discussions on project arrangements KENSOTER; preparation of a KSS brochure
	aft	Preparation 12/3 Seminar; Introduction on NASREC by J. Kauffman (ISRIC)
	eve	Reception at Dutch Ambassador's Residence on the occasion of the visit to Kenya by Drs. J. Pronk, Dutch Minister for Development Cooperation
12-3	mor	Presenting Seminar at ICRAF on PhD. thesis
	aft	Discussions on future cooperation ICRAF/Wageningen with R. Buresh and K. Matungulu
	eve	Meeting Dr. P. Seward (TSBF)
13-3	aft	Discussing NARP-II (with Aore)
14-3	aft	Discussing NARP-II (with Aore)
15-3	mor	Discussions with W. Aore and P.F. Okoth (KSS)
	aft	Meeting K. Matungulu (ICRAF); Preparations for Kisii workshop
16-3		Travel: Nairobi-Kisii; workshop rehearsals with KSS staff
17-3		District workshop Kisii and Nyamira (presentations KSS staff)

	eve	Staff meeting KSS
18-3		District workshop Kisii and Nyamira (presentations provincial, district and divisional staff, and staff from KARI Reg. Res. Centre Kisii)
	eve	Staff meeting KSS; briefing on KENASREC by S. Kauffman (ISRIC)
19-3	mor	District workshop Kisii and Nyamira (general session; wrap-up)
	aft	Travel: Kisii-Nakuru
20-3	mor	Travel: Nakuru-Nairobi
	aft	Report writing
21-3	aft	Report writing
22-3		Meeting KSS staff (cartography, soil physics, soil chemistry, GIS group, LE and FSR group, research projects Okoth and Aore)
23-3	mor	Meeting N. Visser (RNE, Agricultural Attaché)
		Meeting at ICRAF (Dr. Shepherd, Dr. Buresh, Dr. Izac)
	aft	Meetings with Dr. M. Swift and Dr. P. Woomer (TSBF)
24-3	mor	Holding a seminar on PhD. thesis at NARL
	aft	Meeting KSS staff: Database/GIS group, land evaluation group and soil and water management group
25-3		Reporting (Public Holiday)
		Working on NARP-II document with W. Aore and P. Okoth
26-3	mor	Meeting M. Rusch (RNE, Financial Controller) and Dr. R. Bos (RNE, First Secretary)
	aft	Wrap-up session (Dr. Muchena, Aore); Meeting KSS Cartography and Chemistry sections
	5pm	Happy hour for KSS staff
27-3	aft	Finalizing NARP-II proposal with W.W. Aore
	eve	Departure to Amsterdam (KL 595)
28-3	8am	Arrival in Amsterdam

ANNEX 1 LIST OF GIS PRODUCTS AVAILABLE AT KSS

National maps
- KARI National Research Centres
- KARI National Research Centres with Regional Mandate
- KARI Regional Research Centres
- KARI Research subcentres
- Agro-Climatic zone map
- Sulphur status of arable soils of Kenya
- Location of Rainfall Stations in Kenya
- Maize growing areas of Kenya
- Millet growing areas of Kenya
- Sugarcane growing areas of Kenya

All these maps were digitized at scale 1:3 million.

- Forested areas of Kenya (scale 1:1 million).
- Fertilizer response zones for maize in medium and high agricultural pontatial areas. Scale 1:1 million (FURP)
- Exploratory soil map of Kenya (scale 1: 1 million; arcs obtained from UNEP), and derived from this map:
  - Weakly developed soils of the arid regions
  - Sandy soils
  - Low fertility soils
  - Deep red strongly weathered acid soils with low fertility
  - Poorly drained, moderately deep to deep clay soils
  - Shallow and/or juvenile soils
  - Alluvial soils
  - Sodic and/or saline soils
  - Moderately deep to deep soils with high fertility
  - Deep soils with moderate fertility

Data from Central Bureau of Statistics (CBS):
- Population density map of Kenya (Scale 1:1,000,000).
- Map of Kenya with Provincial, District, Division, Location and Sublocation boundaries and their names (Scale 1:500,000).
- Agro-climatic zone map of the maize growing areas of Kenya (Scale 1:1,000,000).

For the CIMMYT/KARI maize database project:
- Map of maize growing areas (Scale 1:1,000,000).
- Agro-climatic zone map of the maize growing areas (Scale 1:1,000,000).

Data from Regional Centre for Services in Surveying, mapping and Remote Sensing:
Map of Kenya with:
- Provincial and District boundaries
- Drainage pattern
- Topography
- Road network

Rift Valley Province

- Semi-Detailed soil map of the Masita Forest (Kenya Forestry College, Londiani), Scale 1:20,000
- Detailed soil map of Tum's Soet farm Kitale (Saboti Division, Trans-Nzoia District) Scale 1:1000
- The soils of Mukogondo Catchment, Laikipia District. Scale 1:10,000
- Erosion susceptibility map of Mokogondo Catchment, Laikipia District, as evaluated by FAO qualitative rating. Scale 1:10,000
- Erosion susceptibility map of Mukogondo Catchment, Laikipia District, as evaluated by KSS qualitative rating. Scale 1:10,000
- The soil map of Sirima Catchment, Laikipia District. Scale 1:12,500
- Erosion susceptibility map of Sirima Catchment, Laikipia District, as evaluated by FAO qualitative rating. Scale 1:12,500
- Erosion susceptibility map of Sirima Catchment, Laikipia District, as evaluated by KSS qualitative rating. Scale 1:12,500.

Coast Province

Kwale District

- Soils, agro-climatic zones, topography, drainage, texture, NPK availability, pH, soil fertility (QUEFTS), soil depth, slope, qualitative suitability for maize and coconut. All these maps are at scale 1:100,000

Nyanza Province

Kisii District

- Administrative boundaries (Divisions, Locations and Sublocations), Roads, towns, markets and rivers; soils, texture, drainage, NPK availability, pH, suitability for tea, pyrethrum, maize and banana.

Nyamira District

- Administrative boundaries (Divisions, Locations and Sublocations), Roads, towns, markets and rivers; soils, texture, drainage, NPK availability, pH, suitability for tea, pyrethrum, maize and banana.

ANNEX 2 PROGRAMME AND LIST OF PARTICIPANTS, KISII/NYAMIRA DISTRICT WORKSHOP

K E N Y A A G R I C U L T U R A L R E S E A R C H I N S T I T U T E

Workshop on the Use of Soil and Land Resources Information in Agricultural Development with Reference to Kisii and Nyamira Districts.

PROGRAMME

Time	**Event**
DAY ONE 17th MARCH	
SESSION ONE:	Chairman: CENTRE DIRECTOR - KISII Rapporteurs: P.F. Okoth and P.T. Gicheru
08.00 - 09.20	REGISTRATION
09.20 - 09.30	General Information by the Organizers
09.30 - 10.00	Opening Address - DIRECTOR NARL
10.00 - 10.15	Address by Kenya Soil Survey Liaison Officer
10.15 - 10.45	COFFEE/TEA BREAK
10.45 - 11.15	Multipurpose Use of Soil Survey Information **S.N. Wanjogu and W.W. Aore**
11.15 - 11.45	Soil Physical Measurements and its Relevance in Land Use Planning **A.E. Ekirapa and P.T. Gicheru**
11.45 - 12.15	The Relevance of Soil Chemical Measurements in Soil Survey **N.P. Ochieng' and W.W. Aore**
12.15 - 12.45	Vegetation Survey Information in the Soil Survey Report **P.N. Macharia**
12.45 - 13.00	Overview of Fertilizer Use Recommendation Project **G.O. Ayaga**
13.00 - 14.00	LUNCH BREAK
SESSION TWO:	Chairman: Dr.E.M.A. Smaling Rapporteurs:A.E. Ekirapa and P.T. Kamoni
14.00 - 14.30	The Importance of Land Use Survey to the Land Use Planner **D.W. Kilambya**

14.30 - 15.00	**Climatology and Its Role in Land Use Planning** **F.M. Ndaraiya**
15.00 - 15.30	COFFEE/TEA BREAK
15.30 - 16.00	Address by Provincial Director of Agriculture, Nyanza
16.00 - 16.15	Address by Provincial Planning Officer, Nyanza
16.15 - 17.00	GIS DEMONSTRATION

DAY TWO: 18th MARCH

SESSION THREE:	Chairman:DAO, Kisii Rapporteurs:W.W. Aore and D.W. Kilambya
08.30 - 09.00	GIS as a Tool for Managing Soil and Land Resources Information **P.T. Kamoni**
09.00 - 09.30	An Agro-Ecological Framework for Integrated Nutrient Management **E.M.A Smaling**
09.30 - 10.00	Development Projects in Kisii District **E.S. Mwavali (DDO - Kisii)**
10.00 - 10.30	Yield of Major Crops in Kisii District **G. Mwangi (District Crops Officer-Kisii)**
10.30 - 11.00	COFFEE/TEA BREAK
11.00 - 11.30	Livestock Production in Kisii District **M.S. Njagi (District Livest. Prod. Officer)**
11.30 - 12.00	Hardships Experienced by Farmers in Kisii District **P. Nyakundi** (Divisional AEO, Kisii)
12.00 - 12.30	Data Availability for Land Use and Urban Planning **P. Isigi (DFMO-Kisii)**
12.30 - 13.00	Cultural Values, Beliefs and their Influence on Agricultural Production in Kisii District **J. Omambia** (Divisional AEO, Kisii)
13.00 - 14.00	LUNCH BREAK
SESSION FOUR:	Chairman: Provincial Director of Agriculture, Nyanza Rapporteurs:E.M. Muya and S.N. Wanjogu

14.00 - 14.30	**Activities of the Project Monitoring and Evaluation Office** **Project Monitoring and Evaluation Officer** **-Nyanza Province -**
14.30 - 15.00	Activities of the PIU in Kisii and Nyamira Districts **Provincial Irrigation Officer, Nyanza Prov.**
15.00 - 15.30	COFFEE/TEA BREAK
15.30 -16.00	The Role of Kisii Regional Research Centre to the Farming Community in Kisii and Nyamira Districts **Centre Director, Kisii RRC.**
16.00 - 17.00	GIS DEMONSTRATION

DAY THREE: 19th MARCH

SESSION FIVE:	Chairman:Dr. F.N. Muchena Rapporteurs:Mr.P.F. Okoth,F.M. Ndaraiya, P.N. Macharia and S.N. Nyangesi
08.30 - 10.30	GROUP DISCUSSION I Use GIS in planning Issues at the District and Divisional level
10.30 - 11.00	COFFEE/TEA BREAK
11.00 - 12.30	GROUP DISCUSSION II Increased Interaction between Research-Extension-Farmer Linkages/GIS DEMONSTRATION
12.00 - 13.15	Recommendations and Conclusions Closing Ceremony
13.15 - 14.15	LUNCH
14.15	DEPARTURE OF PARTICIPANTS

LIST OF EXPECTED PARTICIPANTS

Agricultural Research Institute (KARI)

- Director KARI
- Deputy Director
  Crops, Soil and Water
- Deputy Director
  Livestock Production and Development
- Assistant Director
  Soil, Water and Other Resources
- Assistant Director
  Range Management and animal Production
- Centre Director
  National Agricultural Research Laboratories
- Counterpart Coordinator, Fertilizer Use Recommendation Project
- Kenya Soil Survey - 12 members of staff (plus three from NARL)
- Centre Director Kisii, five members of staff and one Secretary

Provincial Headquarters, Nyanza

- Provincial Director Agriculture.
- Provincial Planning Officer
- Provincial Crops Officer
- Provincial Horticultural Crops Officer
- Provincial Project Monitoring and Evaluation Officer
- Provincial Irrigation Officer
- Provincial Extension Coordinator
- Provincial Soil Conservation Officer

KISII District

- District Agricultural Officer
- District Development Officer
- District Crops Officer
- District Livestock Production Officer
- Divisional Agricultural Extension Officer
- District Farm Management Officer
- District Soil Conservation Officer
- District Irrigation Officer
- District Extension Officer
- District Range Management Officer

NYAMIRA DISTRICT

- District Agricultural Officer
- District Development Officer
- District Crops Officer
- District Farm Management Officer
- District Soil Conservation Officer
- District Irrigation Officer
- District Extension Coordinator

OTHER DISTRICTS

- DAO, Kisumu
- DAO, Homabay
- DAO, Migori

RELATED MINISTRIES

- Director of Research Development
  Ministry of Research, Technical Training and Technology

- Director of Agriculture

DONOR COMMUNITY

- KSS Liaison Officer
- First Secretary, Royal Netherlands Embassy Nairobi.

ANNEX 3 REVIEWING THE KSS ORGANOGRAM

Head
(General Management)

- **Deputy Head**
  (Research, Training and Scientific Editing)
  - Manual cartography and reproduction
  - Library and Data Storage
  - Supplies and transport
- Natural Resources Surveys
- Land Evaluation and Farming Systems Research
- Soil and Water Management
- Soil Chemistry and Fertility
- Database Management and Geographic Information System